Flight-Testing Newton's Laws			
2009 Science			
Academic Standards			
Minnesota Science			
Grades 9-12			
Activity/Lesson	**State**	**Standards**	
Session-10 (1-5)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).
Session-10 (1-5)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-1 (1-17)	MN	SCI.9-12.9.2.2.2.1	Recognize that inertia is the property of an object that causes it to resist changes in motion.
Session-1 (1-17)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).
Session-1 (1-17)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-1 (1-17)	MN	SCI.9-12.9.2.2.2.4	Use Newton’s universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them.
Session-2 (1-10)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).
Session-2 (1-10)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-2 (1-10)	MN	SCI.9-12.9.2.2.2.4	Use Newton’s universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them.
Session-3 (1-6)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).
Session-3 (1-6)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-5 (1-6)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-6 (1-8)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).

Session-6 (1-8)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-7 (1-5)	MN	SCI.9-12.9.2.2.2.2	Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F = ma).
Session-7 (1-5)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-8 (1-9)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Session-9 (1-7)	MN	SCI.9-12.9.2.2.2.3	Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.
Flight-Testing Newton's Laws			
2009 Science			
Academic Standards			
Minnesota Science			
Grades 9-12 (Physics)			
Activity/Lesson	**State**	**Standards**	
Session-10 (1-5)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-10 (1-5)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton’s three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-10 (1-5)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-1 (1-17)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-1 (1-17)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton’s three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-1 (1-17)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-2 (1-10)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.

Session-2 (1-10)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-2 (1-10)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-3 (1-6)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-3 (1-6)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-3 (1-6)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-4 (1-11)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-5 (1-6)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-5 (1-6)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-5 (1-6)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-6 (1-8)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-6 (1-8)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-6 (1-8)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-7 (1-5)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-7 (1-5)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-7 (1-5)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-8 (1-9)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.

Session-8 (1-9)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton’s three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-8 (1-9)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.
Session-9 (1-7)	MN	SCI.9-12.9P.2.2.1.1	Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space.
Session-9 (1-7)	MN	SCI.9-12.9P.2.2.1.2	Apply Newton’s three laws of motion to calculate and analyze the effect of forces and momentum on motion.
Session-9 (1-7)	MN	SCI.9-12.9P.2.2.2.2	Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion.